

UNITED STATES DISTRICT COURT  
SOUTHERN DISTRICT OF NEW YORK

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J.K. INTERNATIONAL PTY. LTD.,

Plaintiff

- against -

07 Civ. 7328 (SHS)

ECF CASE

OLDENDORFF CARRIERS GMBH & CO.,

Defendant

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**DECLARATION OF VAMAN PRABHU**

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**EXHIBIT 1**

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11/28/2007 16:59 FAX 22842356

PANDI, MUMBAI

001

*Attn: Mr. V. Subramanian*

**GOVERNMENT OF INDIA  
INDIA METEOROLOGICAL DEPARTMENT**

**SOUTHWEST MONSOON 2007**

**HIGHLIGHTS**

- For the country as a whole, the seasonal rainfall from 1<sup>st</sup> June to 30<sup>th</sup> September was 105% of its long period average (LPA)
- Seasonal rainfall was excess by 26% over South Peninsula. It was deficient (15% below LPA) over Northwest (NW) India, 8% above LPA over Central India and 4% above LPA over Northeast (NE) India.
- Out of the 36 meteorological sub-divisions, the seasonal (June-September) rainfall was excess in 13 and normal in 17 sub-divisions. However, it was deficient in 6 sub-divisions.
- Out of 513 meteorological districts for which data were available, 72% of the meteorological districts received excess/normal rainfall and the remaining 28% received deficient/scanty rainfall during the season. 77 districts (15%) experienced moderate drought and 30 districts (6%) experienced severe drought at the end of the season.
- Five sub-divisions (viz. West Uttar Pradesh, Haryana, Chandigarh and Delhi, Punjab, Himachal Pradesh and east Madhya Pradesh) experienced moderate drought conditions (rainfall deficiency of 26% to 50%) at the end of the season.
- IMD's long range forecasts for July rainfall over the country as a whole and the 2007 seasonal rainfall over NW India and NE India were proved to be accurate. However, the 2007 monsoon seasonal rainfall over the country as a whole was more than the predicted value.

**END OF SEASON REPORT**

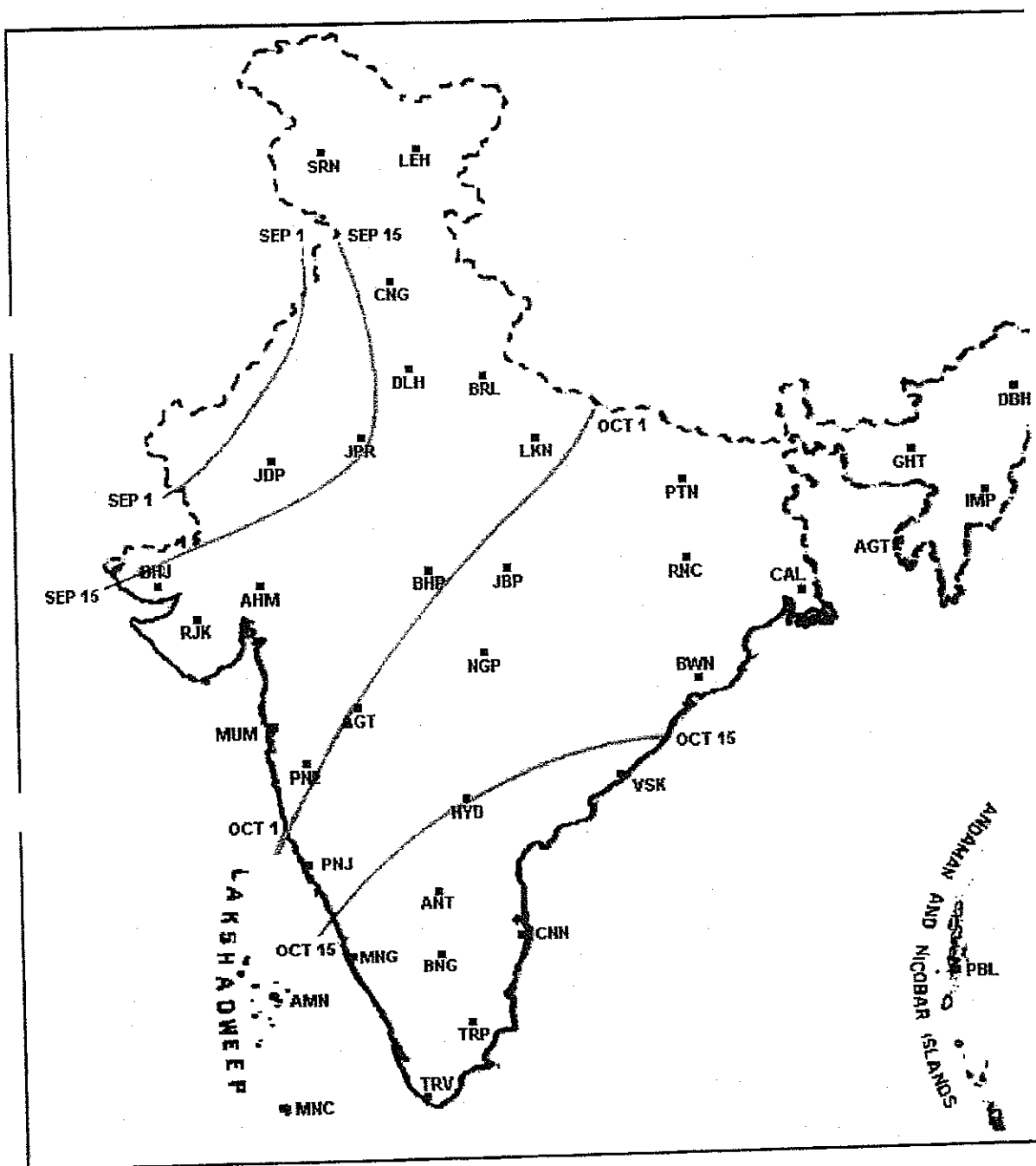
### 1. ONSET OF SOUTHWEST MONSOON

Southwest monsoon advanced over the south Andaman Sea, Nicobar Islands and parts of southeast Bay of Bengal on 10 May about 5 days ahead of its normal date. This was associated with the formation of a Depression over the north Andaman Sea (3<sup>rd</sup> – 5<sup>th</sup> May) and the strengthening of the cross equatorial flow. However, the subsequent advance, was delayed by the formation of the cyclonic storm 'Akash' (13<sup>th</sup> – 15<sup>th</sup> May) over the east central Bay which had an unconventional origin in the mid-latitude westerlies. The system moved northeastward and crossed Bangladesh coast. It disrupted the monsoon flow by prolonging the mid-latitude westerly intrusion over the region. The monsoon revived gradually and arrived over Kerala on 28<sup>th</sup> May, four days prior to the normal date. Once again, the monsoon flow pattern was disrupted due to the formation of the Super Cyclonic Storm 'Gonu' over the east central Arabian Sea (1<sup>st</sup> – 7<sup>th</sup> June) which crossed Oman coast and subsequently the Makaran coast. Further advance of monsoon took place on 8<sup>th</sup> June, after a hiatus of 9 days. It covered the north-eastern states by 10<sup>th</sup> June, Peninsular and Central India by 25<sup>th</sup> June and subsequently the entire country on 4<sup>th</sup> July, nearly 11 days ahead of normal date.

Fig. 1 gives the isochrones of advance of southwest monsoon 2007.

## Regional Meteorological Centre Mumbai

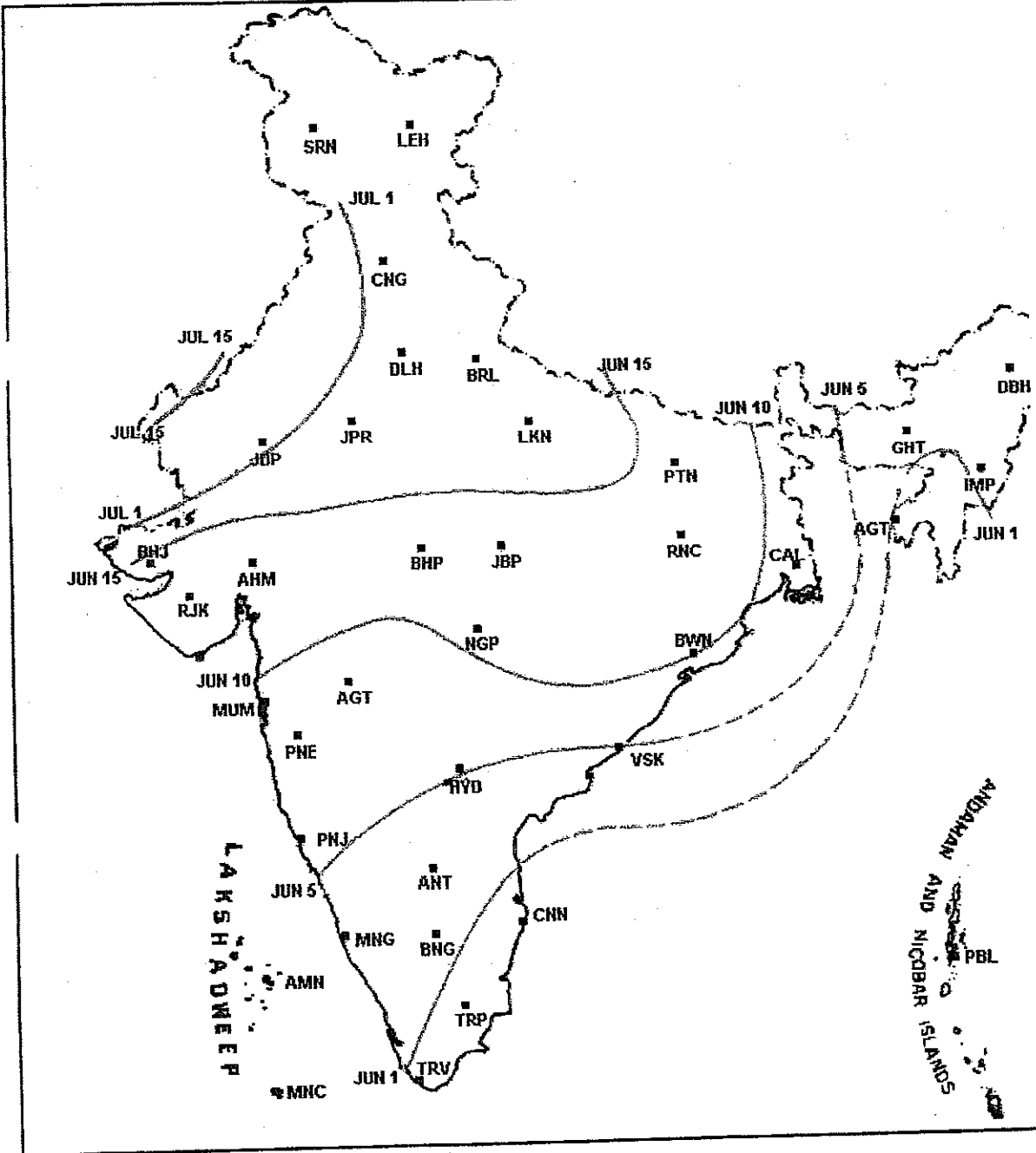
### Normal dates of withdrawal of south-west monsoon over Indian region



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## Regional Meteorological Centre Mumbai

### Normal dates of onset of south-west monsoon over Indian region



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[Withdrawal dates](#)

**PRESS RELEASE**  
***New Delhi, 29 June 2007***

**INDIA METEOROLOGICAL DEPARTMENT**

Long Range Forecast Update  
For 2007 South-west Monsoon Season Rainfall

**1. Background**

Since 2003, India Meteorological Department (IMD) has been following a two-stage forecast strategy for the southwest monsoon rainfall over the country as a whole, in which the first forecast is issued in April with the data up to March and the forecast update is issued by end of June with the data up to May. This year, IMD introduced the following new statistical forecast models for operational long range forecast of southwest monsoon rainfall over the country as a whole.

- a) A new 5- parameter statistical forecasting system requiring data up to March, for the first forecast in April.
- b) A new 6- parameter statistical forecasting system requiring data up to May for the forecast update in June.

The most important aspect of the new forecast system is the introduction of the concept of ensemble forecasts. For developing the models, two different statistical techniques namely, Multiple Regression (MR) and Projection Pursuit Regression (PPR) were considered..

Using the new 5-parameter statistical model, on 19 April, IMD issued the following forecast for the 2007 southwest monsoon rainfall over the country as a whole.

"IMD's long range forecast for the 2007 south-west monsoon season (June to September) rainfall is that the rainfall over the country as a whole is likely to be 95% of the long period average with a model error of  $\pm 5\%$ ."

**2. Second Stage Forecasts**

Now, with the availability of data up to May, IMD has prepared the second stage forecasts, which are being released now:

- a) Forecast update for the 2007 southwest monsoon rainfall over the country as a whole using the new 6-parameter ensemble statistical forecast system. The forecasting system has an error of  $\pm 4\%$ . The Long period average of southwest monsoon rainfall averaged over the country as a whole is 89 cm (based on the 1941-1990 data) with a coefficient of variation of 10%.
- a) Forecast for the rainfall over the country as a whole in the month of July based on a 6-parameter model, which has a model error of  $\pm 9\%$ . The Long period average of monsoon rainfall in the month of July is 293 mm (based on the 1941-1990 data) with a coefficient of variation of 13%.
- b) Forecasts for the South-west Monsoon Season (June-September) rainfall for the following four broad geographical regions of India with a model error of  $\pm 8\%$ :

**Northwest India** – Jammu and Kashmir, Himachal Pradesh, Punjab, Rajasthan, Haryana, Chandigarh, Delhi, Uttaranchal and Uttar Pradesh.

**Northeast India** – Arunachal Pradesh, Meghalaya, Assam, Nagaland, Manipur, Mizoram,



Tripura, Sikkim, West Bengal, Bihar and Jharkhand.

**Central India** – Gujarat State, Madhya Pradesh, Chattisgarh, Maharashtra, Goa and Orissa.

**South Peninsula** – Andhra Pradesh, Karnataka, Tamil Nadu, Kerala, Lakshadweep and Andaman and Nicobar Islands.

The long period average rainfall and coefficient of variation of rainfall of the 4 broad geographical regions of India are given below:

Area	Long period Average (mm)	Coefficient of variation (%)
NW India	612	19
Central India	994	14
NE India	1429	8
South Peninsula	725	15

### 1. Experimental Forecasts

As a part of ongoing efforts to improve the long range forecast capabilities, experimental forecasts for the 2007 south-west monsoon rainfall based on the IMD's dynamical forecast system (Seasonal Forecast model of the Experimental Climate Prediction Centre (ECPC), USA) were also generated. Forecasts have been generated using observed sea surface temperature data of May and using the persistence method.

In addition, IMD has also taken into account the experimental forecasts prepared by national institutes like Indian Institute of Tropical Meteorology, Pune, National Centre for Medium Range Weather Forecast (NCMRWF), Noida, Indian Institute of Science, Bangalore, Space Applications Centre, Ahmedabad, National Aerospace Laboratory, Bangalore and Centre for Mathematical Modelling and Computer Simulation (CMMACS) Bangalore and operational/experimental forecasts prepared by international institutes like the National Centers for Environmental Prediction (NCEP), USA, International Research Institute for Climate and Society (IRI), USA, Meteorological Office, UK, the European Center for Medium Range Weather Forecasts (ECMWF), UK, the Tokyo Climate Centre and the Experimental Climate Prediction Center (ECPC), USA.

### 2. Onset and Advance of Monsoon 2007

Southwest monsoon advanced over south Andaman Sea on 11 May, almost 10 days earlier than the normal date. IMD predicted that the monsoon onset over Kerala this year would take place on 24<sup>th</sup> May with a model error of  $\pm 3$  days. Monsoon advanced over Kerala on 28<sup>th</sup> May, 4 days earlier than the normal date of 1<sup>st</sup> June. By 29 May, monsoon covered the entire coastal Karnataka and some parts of south interior Karnataka and south Tamil Nadu. After this, there was hiatus in the advancement of monsoon for about one week. The hiatus was caused by the formation of the Super Cyclone "Gonu" over Arabian Sea, and its northwestward movement towards the Arabian coast.

On 8 June, monsoon advanced over some more parts of south interior Karnataka, Tamil Nadu, the entire Nagaland-Manipur-Mizoram-Tripura, some parts of Assam & Meghalaya and Arunachal Pradesh. By 10 June, it covered most parts of Northeast India and advanced over some parts of Bihar. Between 13 to 18 June, monsoon covered Konkan and Goa, Andhra Pradesh, Orissa, West Bengal, most parts of Orissa and some parts of Maharashtra, Orissa, Chattisgarh and Jharkhand. On 26 June, southwest monsoon has further advanced into some parts of east Uttar Pradesh, remaining parts of Uttarakhand, entire Himachal Pradesh, Jammu and Kashmir and northern parts of west Uttar Pradesh, Haryana and Punjab. On 28 June, Southwest monsoon has

further advanced into the remaining parts of Madhya Pradesh & Uttar Pradesh, most parts of East Rajasthan, some parts of west Rajasthan and some more parts of Haryana (including Delhi) and Punjab. As on 28 June, the northern limit of monsoon passes through Barmer, Jodhpur, Ajmer, Jaipur, Narnaul, Rohtak, Ludhiana and Amritsar.

The accumulated seasonal rainfall over the country as a whole during the period 1-27 June was 107 % of long period average.

### **3. La Nina Conditions over the equatorial Pacific**

The warm sea surface temperature (SST) anomalies over the east equatorial Pacific associated with the moderate El Nino of 2006 have disappeared during February 2007. By the end of February 2007, SSTs were near average in the vicinity of the date line, and below average over the eastern equatorial Pacific. ENSO-neutral conditions continued in the tropical Pacific during May and June 2007. Equatorial SSTs during the last four weeks were more than 1°C below average in areas between 120°W and the South American coast, and more than 0.5°C above average in portions of the western Pacific. For the week ending 13 June, the SST anomalies were +0.2°C and +0.4°C in the Niño 3.4 and Niño 4 regions respectively.

Most statistical models show ENSO-neutral conditions persisting through August 2007, while most dynamical models indicate La Niña will develop within the next three months. However, for the past few months the dynamical models have been predicting a stronger and more rapid cooling than has actually occurred.

### **4. Summary of the forecasts**

#### **i) South-West Monsoon Season Rainfall**

IMD's Long Range Forecast update for the 2007 South-West Monsoon Season (June-September) is that for the country as a whole the seasonal rainfall is likely to be 93% of the Long Period Average (LPA) with a model error of  $\pm 4\%$ .

#### **ii) July rainfall**

Rainfall over the country as a whole in the month of July 2007 is likely to be 95% of its LPA with a model error of  $\pm 9\%$ .

#### **iii) Rainfall over broad geographical regions**

Over the four broad geographical regions of the country, rainfall for the 2007 South-West Monsoon Season is likely to be 90% of its LPA over North-West India, 98% of its LPA over North-East India, 96% of its LPA over Central India and 94% of its LPA over South Peninsula, all with a model error of  $\pm 8\%$ .

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- Out of 513 meteorological districts for which data were available, 72% of the meteorological districts received excess/normal rainfall and the remaining 28% received deficient/scanty rainfall during the season. 77 districts (15%) experienced moderate drought and 30 districts (6%) experienced severe drought at the end of the season.
- Five sub-divisions (viz. West Uttar Pradesh, Haryana, Chandigarh and Delhi, Punjab, Himachal Pradesh and east Madhya Pradesh) experienced moderate drought conditions (rainfall deficiency of 26% to 50%) at the end of the season.
- IMD's long range forecasts for July rainfall over the country as a whole and the 2007 seasonal rainfall over NW India and NE India were proved to be accurate. However, the 2007 monsoon seasonal rainfall over the country as a whole was more than the predicted value.

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# 1. ONSET OF SOUTHWEST MONSOON

Southwest monsoon advanced over the south Andaman Sea, Nicobar Islands and parts of southeast Bay of Bengal on 10 May about 5 days ahead of its normal date. This was associated with the formation of a Depression over the north Andaman Sea (3<sup>rd</sup> – 5<sup>th</sup> May) and the strengthening of the cross equatorial flow. However, the subsequent advance, was delayed by the formation of the cyclonic storm 'Akash' (13<sup>th</sup> – 15<sup>th</sup> May) over the east central Bay which had an unconventional origin in the mid-latitude westerlies. The system moved northeastward and crossed Bangladesh coast. It disrupted the monsoon flow by prolonging the mid-latitude westerly intrusion over the region. The monsoon revived gradually and arrived over Kerala on 28<sup>th</sup> May, four days prior to the normal date. Once again, the monsoon flow pattern was disrupted due to the formation of the Super Cyclonic Storm 'Gonu' over the east central Arabian Sea (1<sup>st</sup> – 7<sup>th</sup> June) which crossed Oman coast and subsequently the Makaran coast. Further advance of monsoon took place on 8<sup>th</sup> June, after a hiatus of 9 days. It covered the north-eastern states by 10<sup>th</sup> June, Peninsular and Central India by 25<sup>th</sup> June and subsequently the entire country on 4<sup>th</sup> July, nearly 11 days ahead of normal date.

Fig. 1 gives the isochrones of advance of southwest monsoon 2007.



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**GOVERNMENT OF INDIA  
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- Five sub-divisions (viz. West Uttar Pradesh, Haryana, Chandigarh and Delhi, Punjab, Himachal Pradesh and east Madhya Pradesh) experienced moderate drought conditions (rainfall deficiency of 26% to 50%) at the end of the season.
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Fig. 1 gives the isochrones of advance of southwest monsoon 2007.

### 2. SYNOPTIC FEATURES

Formation of two intense low pressure systems over the Arabian Sea in the month of June is a unique feature of the southwest monsoon 2007, barring the years 1948, 1930, 1925 & 1907. Gonu is the first ever Super Cyclone formed over the Arabian Sea. The Cyclonic Storm, 'Yemyin' (25-26 June) formed from the remnants of a Deep Depression which formed over the Bay of Bengal and emerged into the Arabian Sea as a low pressure area after traversing the peninsula. This system moved away north-westwards and crossed Pakistan coast, without affecting the weather over the country. Apart from the above two Cyclonic Storms, 11 more low pressure systems including 4 Deep Depressions, 1 Depression, 4 well marked low pressure areas and 2 low pressure areas formed during the season. Most of these systems formed over the Bay of Bengal except a well marked low pressure area (23<sup>rd</sup> – 25<sup>th</sup> September) which formed over the Arabian Sea in September. All the systems over the Bay of Bengal moved generally in a west-northwesterly to northwesterly direction, giving rise to extremely heavy rainfall (25 cm. or more) many a times over Orissa, Gangetic West Bengal, Bihar, Andhra Pradesh, Chhattisgarh, Madhya Pradesh, Rajasthan, Gujarat and also in Maharashtra and Karnataka.

Tracks of the Cyclonic Storms and Depressions during the season are shown in Fig. 2.

### 3. RAINFALL DISTRIBUTION DURING MONSOON SEASON

The southwest monsoon rainfall (June to September) for the period 1 June to 30 September 2007 for the country as a whole and the four broad homogeneous regions are as follows:

Region	Actual (mm)	Normal (mm)	Percentage Departure
All-India	936.9	892.2	5%
Northwest (NW) India	520.8	611.6	-15%
Central India	1073.8	993.9	8%
South peninsula	907.3	722.6	26%



## INDIA METEOROLOGICAL DEPARTMENT

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Northeast (NE) India	1485.9	1427.3	4%
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In 2007, the southwest monsoon seasonal (June to September) rainfall over the country as a whole was 105% of its LPA. Seasonal rainfall over NW India was below its LPA by 15%. However, over south Peninsula, seasonal rainfall was above its LPA by 26%. Similarly, Central India and NE India also experienced above average seasonal rainfall (8% and 4% above LPA respectively). The above average performance of the monsoon rainfall over the country was mainly due to the excess rainfall observed over South Peninsula and Central India.

The cumulative rainfall from 1 June to 30 September 2007 was excess in 13, normal in 17 and deficient in 6 meteorological sub-divisions. The sub-divisionwise cumulative rainfall distribution is shown in Fig.3. Five sub-divisions (West Uttar Pradesh, Haryana, Chandigarh and Delhi, Punjab, Himachal Pradesh and east Madhya Pradesh) experienced moderate drought conditions (rainfall deficiency of 26% to 50%) at the end of the season. Arunachal Pradesh received deficient rainfall (20% below its LPA).

Out of 513 meteorological districts for which data were available, 144 districts (28%) received deficient rainfall (rainfall deficiency more than 19%) during the season, out of which 77 districts (15%) experienced moderate drought conditions (rainfall deficiency 26% to 50%) and 30 districts (6%) experienced severe drought conditions (rainfall deficiency 51% and more). The rainfall was excess (actual rainfall higher than LPA by 20% or more) over 164 districts (32%) during the season.

Month-wise distribution of rainfall departure over the country as a whole is given below:

June: 19% above LPA,	July: 3% below LPA,
August: 1% below LPA	September: 18% above LPA

The spatial distribution of monthly rainfall is shown in Fig.4.

Figures 5 and 6 depict the monsoon rainfall as received week by week and the cumulative rainfall during the season respectively. In June, the weekly rainfall was below normal during the first two weeks and above normal during the remaining weeks. In July, the rainfall was above normal during the first two weeks and below normal during the remaining weeks. In August, the rainfall was below normal during all weeks except the first week. In September, the rainfall was below normal during the 3<sup>rd</sup> week and above normal during all other weeks. Large rainfall deficiency was observed during the 1<sup>st</sup> week of June, 3<sup>rd</sup> and 4<sup>th</sup> weeks of July and 3<sup>rd</sup> week of August. During the season, cumulative seasonal rainfall over the country as a whole remained always above normal since last week of June (Fig.6). By this week, the cumulative seasonal rainfall was above normal by 7%. At the end of subsequent week (1<sup>st</sup> week of July) the cumulative seasonal rainfall increased and became above normal by 20%. However, by the end of July, the cumulative seasonal rainfall decreased and became 3% above normal. At the end of August, the cumulative seasonal rainfall was 2% above normal, and it became 5% above normal by end of the season.

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## 4. Flood situations

The uneven distribution of rainfall in space and time caused flood situations in many states viz. Assam, Meghalaya, Arunachal Pradesh, Manipur, Tripura, Andhra Pradesh, Kerala, Karnataka, Maharashtra, Orissa, Chattisgarh, Gujarat, Rajasthan, Madhya Pradesh, West Bengal, Jharkhand, Bihar, Uttar Pradesh, Himachal Pradesh, Uttarakhand, Jammu & Kashmir, Punjab and Haryana during various parts of the season.

## 5. Withdrawal of southwest monsoon.

This year, there was an unusual delay in the withdrawal of monsoon from extreme west Rajasthan, due to the prevalence of cyclonic circulations, availability of moisture and sporadic rainfall over the region. However, the southwest monsoon withdrew from western parts of Rajasthan and some parts of Punjab and Haryana on 30<sup>th</sup> September. The normal date of withdrawal from west Rajasthan is 15<sup>th</sup> September. During the period 1960-2006, the most delayed date of monsoon withdrawal from extreme west Rajasthan was 28<sup>th</sup> September, which occurred in the years 1964 & 1970. In the year 1990 also the withdrawal started as late as 27<sup>th</sup> September.

## 6. LONG RANGE FORECAST OF MONSOON RAINFALL

In May 2007, using an indigenously developed statistical model, IMD predicted that monsoon onset over Kerala would take place on 24<sup>th</sup> May with a model error of  $\pm 3$  days. This year, the monsoon onset over Kerala was on 28<sup>th</sup> May, four days earlier than its normal date of 1<sup>st</sup> June.

As per the long range forecast for the 2007 southwest monsoon seasonal rainfall issued in April, the seasonal rainfall for the country as a whole was expected to be 95% of LPA with a model error of  $\pm 5\%$ . In the updated forecast issued on 29 June, the forecast for the country as a whole was revised as 93% of LPA with a model error of  $\pm 4\%$ . The season ended with the area-weighted rainfall for the country as a whole at 105% of the LPA, more than the error limit of the IMD's long range forecast. Considering 4 broad homogeneous regions of India, rainfall was expected to be 90% of its LPA over NW India, 96% of LPA over Central India, 98% of LPA over NE India and 94% of LPA over South Peninsula with a model error of  $\pm 8\%$ . The actual rainfall over these 4 regions was 85%, 108%, 104% and 126% of the LPA respectively. Thus, the seasonal rainfall over NW and NE India was well-predicted, whereas the rainfall over both Central India and South Peninsula was higher than predicted.

IMD also issued the long range forecast for rainfall over the country as a whole in July 2007 as 95% of its LPA. The actual rainfall in July 2007 was 97% of LPA, very close to the predicted value. The Table below gives the summary of the verification of the long range forecasts issued for the 2007 southwest monsoon.

Table  
Details of long range forecasts and actual rainfall.

Region	Period	Issued on	Forecast	Actual



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All India	June to September	19 April, 2007 29 June, 2007	95% of LPA $\pm$ 5% 93% of LPA $\pm$ 4%	105% of LPA
All India	July	29 June, 2007	95% of LPA $\pm$ 9%	97% of LPA
Northwest India	June to September	29 June, 2007	90% of LPA $\pm$ 8%	85% of LPA
Northeast India			98% of LPA $\pm$ 8%	104% of LPA
Central India			96% of LPA $\pm$ 8%	108% of LPA
South Peninsula			94% of LPA $\pm$ 8%	126% of LPA

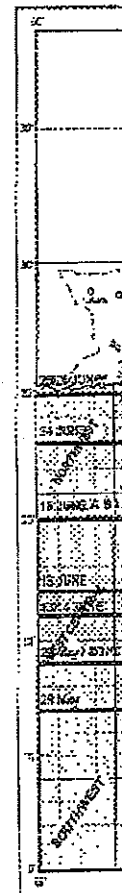


Fig.1. Progress of Southwest Monsoon – 2007.



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भारत मौसम विज्ञान विभाग  
INDIA METEOROLOGICAL DEPARTMENT

MONSOON 2007

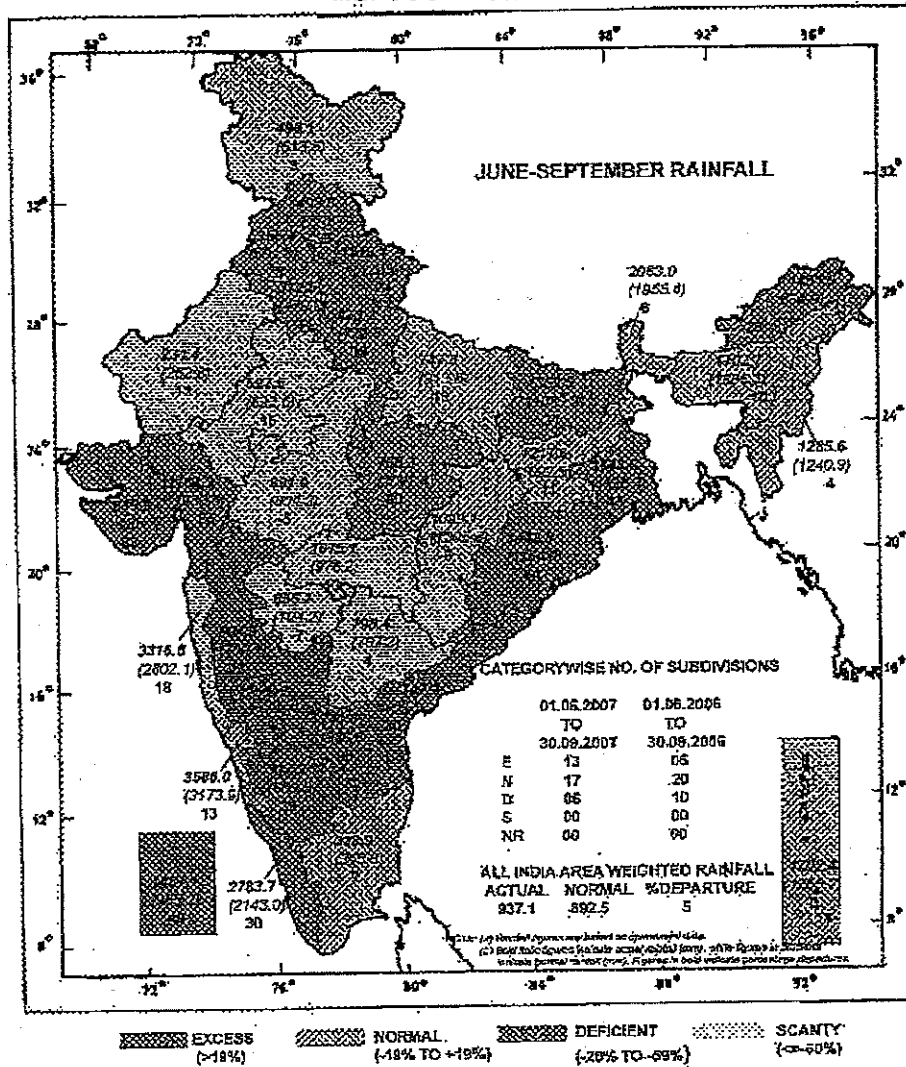


Fig.3. Sub-divisionwise rainfall distribution over India during southwest monsoon season (June to September) – 2007

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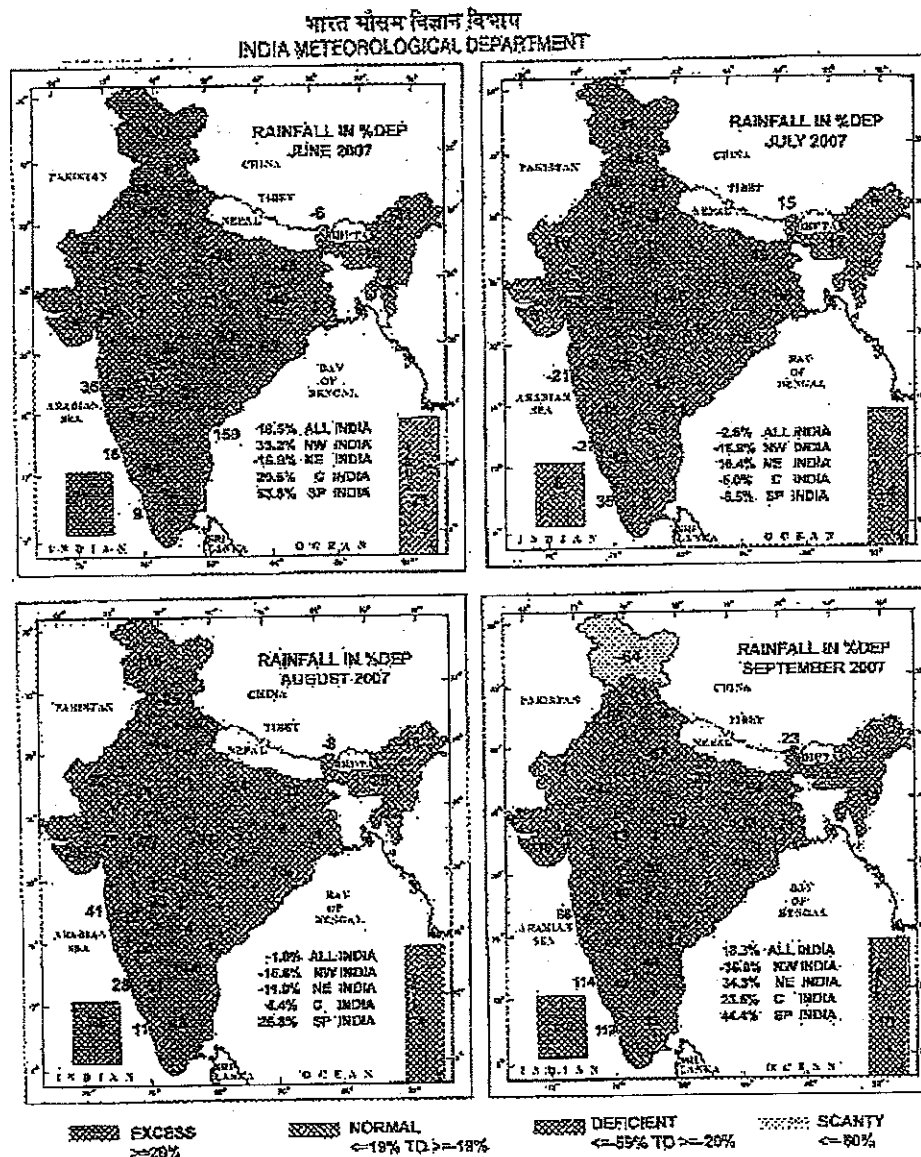


Fig.4. Sub-divisionwise monthly rainfall distribution over India  
during southwest monsoon season – 2007

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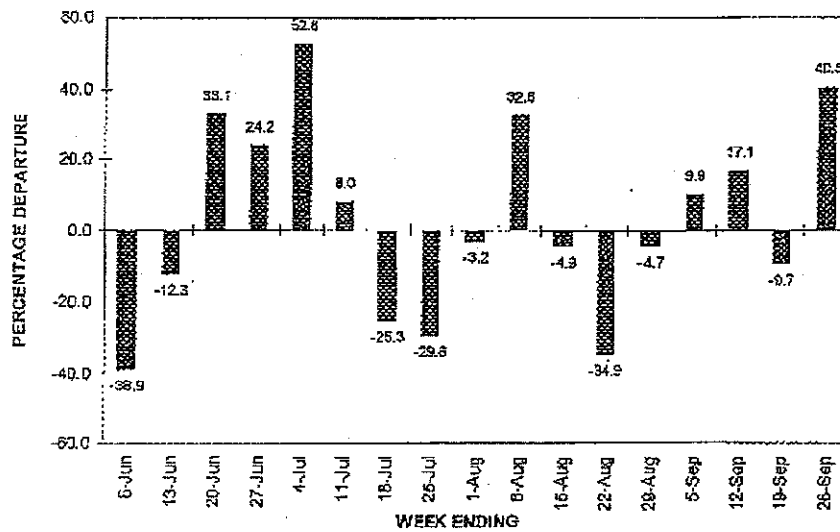


Fig.5. Progress of the weekly monsoon rainfall - 2007

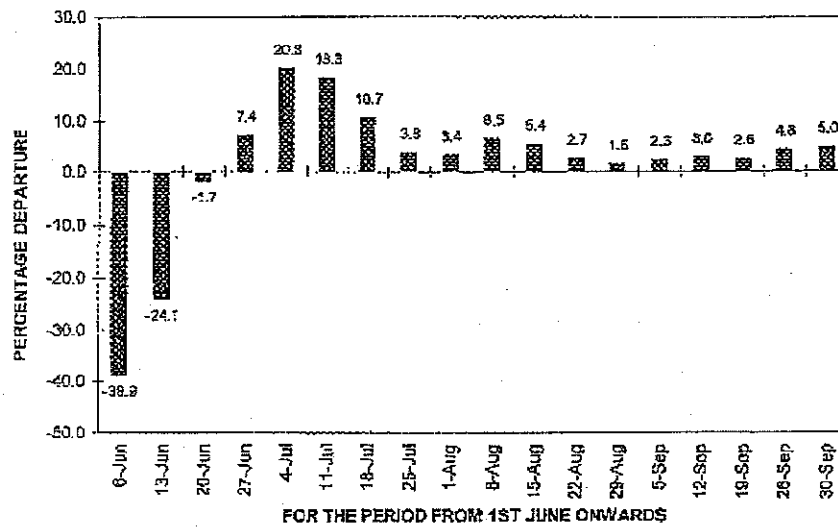


Fig.6. Progress of the weekly cumulative monsoon rainfall - 2007

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